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Activities relating to drinking water and wastewater services — Guidelines for the management of basic on-site domestic wastewater services

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National foreword

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Activities relating to drinking water and wastewater services — Guidelines for the management of basic on-site domestic wastewater services

Activités relatives aux services de l'eau potable et des eaux usées — Lignes directrices pour la gestion sur site des services d'eaux usées domestiques de base

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see the following URL: www.iso.org/iso/foreword.html.

The committee responsible for this document is Technical Committee ISO/TC 224, *Service activities relating to drinking water supply systems and wastewater systems — quality criteria of the service and performance indicator*.

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Introduction

0.1 Water issues: global context and policies framework

Water constitutes a worldwide challenge for the 21st century, both in terms of the management of available water resources and the provision of access to drinking water and sanitation for the world's population. In 2000, the United Nations recognized that access to water is an essential human right and, in conjunction with national governments, it set ambitious goals (the "Millennium Development Goals") to increase access to drinking water and wastewater services, including safe disposal or reuse of residues (jointly referred to as "water services" in this International Standard), particularly in developing countries. International conferences on sustainable development and water (e.g. the World Summit on Sustainable Development in Johannesburg in September 2002, the third World Water Forum in Kyoto in March 2003 and the fourth World Water Forum in Mexico City in March 2006) have highlighted this issue, and UN agencies (including WHO and UNESCO) have developed recommendations and programmes to establish a framework in which to advance.

The United Nations Commission on Sustainable Development has emphasised that governments have a primary role in promoting improved access to safe drinking water and basic sanitation through improved governance at all levels and appropriate enabling environments and regulatory frameworks, with the active involvement of all stakeholders.

NOTE Governments are referred to as "relevant authorities" in ISO 24510, ISO 24511 and ISO 24512).

If institutional solutions are incorporated into this process, the water sector becomes more productive and the management of water resources becomes more sustainable. Declarations from the World Water Forum have recommended that governments endeavour to reinforce the role of parliaments and local public authorities, particularly with regard to the provision of adequate water services, and have recognized that an effective collaboration with and between these actors is a key factor for meeting water-related challenges and goals.

Examples of key issues for efficient drinking water and sanitation services policy frameworks are:

— clearly defining the roles of the different stakeholders;

— establishing how sanitary rules and organization are defined and assessed;

— establishing processes to ensure consistency between the policies regarding urban development and water utility infrastructure;

— regulating water withdrawal and wastewater discharge;

— providing information to users and communities.

0.2 Water utilities: general objectives

In addition to public health protection, sound management of the drinking water and wastewater utilities (jointly referred to as "water utilities" in this International Standard) is an essential element of integrated water resources management. When applied to these utilities, sound management practices will contribute, both quantitatively and qualitatively, to sustainable development. Sound utility management also contributes to social cohesion and economic development of the communities served, because the quality and efficiency of water services have implications for virtually all activities of society.

As water is considered to be a social good and activities related to water services support the three aspects (economic, social and environmental) of sustainable development, it is logical that the management of water utilities be transparent to, and inclusive of, all stakeholders identified in accordance with the local context.

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There is a broad array of stakeholders that can play a role in activities related to water services. Examples of such stakeholders include:

— governments or public agencies (international, national, regional or local);

— associations of the utilities themselves (e.g. international, regional/multinational and national drinking water or wastewater associations);

— autonomous bodies seeking to play an overview role (e.g. organizations concerned, such as non-governmental organizations);

— users and associations of water users.

The relationships between stakeholders and water utilities vary around the world. In many countries, there are bodies that have responsibility (in whole or in part) for overseeing the activities related to water services, whether the utilities are publicly or privately owned or operated, and whether they are regulated by relevant authorities or acting in a system of technical self-regulation. Standardization and technical self-regulation are possible ways of ensuring involvement of all stakeholders and meeting the subsidiarity principle.

The aim of water utilities is to offer services to everybody in the area of responsibility of the utility, to provide users with a continuous supply of drinking water and to collect and treat wastewater under economic and social conditions that are acceptable to the users and to the utility. Water utilities are expected to meet the requirements of relevant authorities and the expectations specified by the responsible bodies in conjunction with the other stakeholders, while ensuring the long-term sustainability of the service. In a context of scarcity of resources, including financial resources, it is advisable that the investments made in installations be appropriate and that necessary attention be paid to proper maintenance and effective use of the installations. It is advisable that water tariffs generally aim at meeting cost-recovery principles and at promoting efficiency in the use of the resources, while striving to maintain affordable basic access to water services.

It is advisable that the stakeholders be involved in both setting service objectives and assessing the adequacy and efficiency of service.

0.3 Objectives, content and implementation of ISO standards addressing water services

The ISO standards addressing water services are ISO 24510 (service-oriented), ISO 24511 and ISO 24512 (both management-oriented). The objective of these ISO standards is to provide the relevant stakeholders with guidelines for assessing and improving the service to users and guidance for managing water utilities, consistent with the overarching goals set by the relevant authorities.

ISO 24510 contains the following:

— a brief description of the components of the service relating to the users;

— core objectives for the service, with respect to the needs and expectations of users;

— guidelines for satisfying the needs and expectations of users;

— assessment criteria for service to users in accordance with the provided guidelines;

— examples of performance indicators linked to the assessment criteria that can be used for assessing the performance of the service.

ISO 24511 and ISO 24512 contain the following:

— a brief description of the physical/infrastructural and managerial/institutional components of water utilities;

— core objectives for water utilities, considered to be globally relevant at the broadest level;

— guidelines for the management of the water utilities;

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— guidelines for the assessment of the water services with service assessment criteria related to the objectives, and performance indicators linked to these criteria.

The performance indicators presented in ISO 24510, ISO 24511 and ISO 24512 are for illustrative purposes only, because assessing the service to users cannot be reduced to a single or universal set of performance indicators.

The quality of the supplied water (or discharged wastewater) can be adversely impacted between the point-of-delivery (or, in the case of wastewater, the point-of-collection) and the point-of-use (or, in the case of wastewater, the point-of-discharge) by the installations inside the premises. Some stakeholders (e.g. relevant authorities, owners, contractors and users) can have a role to play regarding this issue.

Recognizing that the organization of water utilities differs from country to country, the guidelines given in ISO 24510, ISO 24511 and ISO 24512 focus on the needs and expectations of users and on the water services themselves, without imposing a means of meeting those needs and expectations, in order to permit the broadest possible use of ISO 24510, ISO 24511 and ISO 24512 while respecting the cultural, socio-economic, climatic, health and legislative characteristics of the different countries and regions of the world. In the short term, it might not always be possible to meet the expectations of local users, due to factors such as climate conditions, resource availability and difficulties relating to the economic sustainability of the water services, particularly regarding financing and the capacity of users to pay for improvements. These conditions can limit the achievement of some objectives or restrict the implementation of some recommendations in developing countries. However, ISO 24510, ISO 24511 and ISO 24512 are drafted with such constraints in mind and, for example, allow for differing levels of fixed networks and the need for on-site alternatives. Notwithstanding the need for flexibility in terms of engineering and hardware, many recommendations in ISO 24510, ISO 24511 and ISO 24512, such as consultation mechanisms, are intended to apply universally.

In order to assess and improve the service to users and to ensure proper monitoring of the improvements, an appropriate number of performance indicators (PIs) or other methods can be established for checking conformity with requirements. Stakeholders can select PIs from the examples given in ISO 24510, ISO 24511 and ISO 24512, or develop other relevant PIs taking into account the principles described. The PIs logically relate to the objectives for which they are defined through the assessment criteria, and are used to measure performance. They can also be used to set required or targeted values. ISO 24510, ISO 24511 and ISO 24512 do not impose any specific indicator or any minimum value or performance range; they respect the principle of adaptability to local contexts, facilitating local implementation. ISO 24510, ISO 24511 and ISO 24512 can serve to assess progress towards water policy goals and the objectives of financing programmes, by providing guidelines for the continual improvement and for the assessment of the service.

ISO 24510, ISO 24511 and ISO 24512 are consistent with the principle of the “Plan-Do-Check-Act” (PDCA) approach: they propose a step-by-step process, from identifying the components and defining the objectives of the utility to establishing performance indicators, with a loop back to the objectives and to the management, after having assessed the performances. ISO 24510, ISO 24511 and ISO 24512 are consistent with management systems standards such as ISO 9001 and ISO 14001. Implementation of an overall ISO 9001 and/or ISO 14001 management system can facilitate the implementation of the guidelines contained within ISO 24510, ISO 24511 and ISO 24512; conversely, these guidelines can help to achieve the technical provisions of ISO 9001 and ISO 14001 for organizations choosing to implement them.

0.4 Basic on-site domestic wastewater services

The absence of basic on-site sanitation services globally is a major inhibitor of achieving global societal goals of improving public health and economic development. This situation prevails in both developed and developing countries. Although often thought of as a rural problem, it is also a fact for many peri-urban and urbanized areas. According to the United Nations (see Reference [5]), 2,1 billion people gained access to improved sanitation facilities between 1990 and 2015. However, by 2015, 2,4 billion people still lacked improved sanitation and 946 million people, accounting for 13 % of the world’s population, practiced open defecation.

Poor sanitation facilities are often linked to contaminated water sources, which in turn are linked to transmission of diseases such as cholera, diarrhoea, dysentery, hepatitis A and typhoid. In addition

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such conditions are often exacerbated by inadequate or absent health care facilities, which exposes already vulnerable patients to additional risk of infection and disease. UNICEF estimates that diarrhoea is the second largest killer of children under the age of five in the developing world and this is caused largely by poor sanitation and inadequate hygiene.

The environmental and public health impacts of the lack of sanitation facilities depend on the density of the population. In sparsely populated rural and remote areas, the lack of sanitation facilities might not result in significant risk as urine and faecal deposits (also referred to as "open defecation") might be handled ecologically to a satisfactory level. However, as population density increases, a point is reached where the failure of natural absorption or decomposition processes become both a public health and an environmental risk. In such circumstances, basic on-site wastewater services can be installed. These can be either on the scale of a single family unit or on a community scale, although the latter requires collection systems of some type and can include transportation and disposal. Regardless of the type of on-site domestic wastewater services in place, its scale or the level of technology installed, the services and processes need to be managed to ensure effective operation within the socio-economic and cultural conditions.

Management of on-site domestic wastewater services of all types and at all levels of technology requires an understanding of the biological processes at work, the factors that can inhibit those processes and the means of ensuring those processes are functioning. It also involves a general understanding by the wider community served of the benefits of sanitation system use and management. In this way, the sanitation facilities work efficiently and help sustain the community in which they are located. Management of the services is often considered to be the responsibility of the relevant authority, whether it is local or supported by larger scale water utilities. However, in many instances, the management of the basic on-site domestic wastewater services is the responsibility of the user in collaboration with the local authorities.

Many of these basic on-site sanitation systems are located near or adjacent to sanitation services, under professional supervision and operation. In many cases, the basic on-site systems can be supported by the nearby larger scale wastewater services, e.g. through the collection of wastewater or partially treated sanitary effluents for further treatment/disposal in the larger facility. This symbiotic relationship provides an opportunity for small scale sanitation facilities without needing to host all the technology or experienced wastewater treatment systems and staff on-site. In other cases, the management of the large scale facility can provide supervisory technical services to the neighbouring basic system operators, to help train and ensure effective treatment levels.

This International Standard provides guidelines on the management of such basic on-site domestic wastewater services with a focus on improving hygiene, taking into account social norms through stakeholder communication, management of assets and better management of human waste and wastewater.

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Activities relating to drinking water and wastewater services — Guidelines for the management of basic on-site domestic wastewater services

1 Scope

This International Standard provides guidance for the management of basic on-site domestic wastewater services, using appropriate technologies in their entirety at any level of development.

This International Standard supplements and is intended to be used in conjunction with ISO 24511. It includes the following:

— guidelines for the management of basic on-site domestic wastewater services from the operator's perspective, including maintenance techniques, training of personnel and risk considerations;

— guidelines for the management of basic on-site domestic wastewater services from the perspective of users;

— guidance on the design and construction of basic on-site domestic wastewater systems;

— guidance on planning, operation and maintenance, and health and safety issues.

The following are outside the scope of this International Standard:

— limits of acceptability for wastewater discharged into a receiving body;

— analytical methods;

— the management structure of sanitary waste/wastewater service activities of operation and management;

— the content of contracts or subcontracts.

This International Standard is applicable to both publicly and privately operated basic on-site domestic wastewater (black and grey water) services, for one or more dwellings.

NOTE 1 Management of on-site domestic wastewater, especially in rural areas and areas under development, is sometimes provided by the owners of the premises where wastewater is generated. In such cases, the owners of the premises carry out the management of domestic wastewater by themselves. In this International Standard, the term "services" includes "self-services" provided by the owners of the premises.

NOTE 2 Especially in undeveloped areas, domestic wastewater is collected in an undiluted form (i.e. sanitary waste). Sources of sanitary waste/wastewater in this International Standard are residential, excluding storm water runoff.

NOTE 3 Annex A contains a table of correspondence between equivalent terms in English, French and Spanish.

NOTE 4 Annex B gives some examples of schematics of basic on-site domestic wastewater systems and components.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

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ISO 24510, *Activities relating to drinking water and wastewater services — Guidelines for the assessment and for the improvement of the service to users*

ISO 24511, *Activities relating to drinking water and wastewater services — Guidelines for the management of wastewater utilities and for the assessment of wastewater services*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 24510 and ISO 24511 and the following apply.

NOTE All terms and definitions from ISO publications are publicly available on the ISO Online Browsing Platform (www.iso.org/obp).

3.1
basic
minimum equipment or process required to treat wastewater and meet discharge objectives

3.2
basic on-site domestic wastewater
water containing only human body waste and human liquid waste, which can contain grey water from washing but does not contain commercial or industrial discharges

3.3
excreta
waste products of human metabolism, in solid or liquid form, generally urine and/or faeces

3.4
land treatment
treatment that can include simply spraying homogenized waste onto a land surface for bacterial breakdown through the effects of sun and climate or subsurface discharge of partially treated wastewater (after removal of suspended solids) and decomposition of dissolved organics in the soil anaerobic environment

3.5
technology
specific infrastructure or method that is designed to collect, store, treat, use and/or transport wastewater and/or residues

3.6
wetland
natural or constructed lined media filled bed, into which effluent is discharged and which contains suitable flora and fauna that grow and feed on the nutrients in the effluent

Note 1 to entry: These are "natural" alternatives to a biological treatment process involving buildings, aeration systems and sedimentation systems. However, these "natural" systems also require maintenance, i.e. periodic removal of overgrown flora and fauna as well as collected sediment.

4 Objectives

4.1 General

Basic on-site domestic wastewater services are in many cases not provided by others; instead, wastewater collection, transport and disposal is carried out by the owner of the premises where wastewater is generated.

The four main objectives of basic on-site domestic wastewater services are:

— public health and safety;

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— occupational health and safety;

— environmental protection;

— sustainable development.

Basic on-site domestic wastewater system solutions should adapt to local conditions, respond to actual needs and be adaptable to a changing environment.

Besides constituting these main objectives, basic on-site sanitation solutions should consider the following:

— effective disease barrier;

— prevention of environmental pollution;

— environmental requirements;

— optimization of the use of resources in terms of nutrients, water and energy;

— simplicity of construction, use, operation, maintenance and repair;

— adherence to hygienic safety standards;

— affordability and willingness to pay;

— existing institutional support;

— existing best practice, experience and infrastructure;

— development of ownership, involving landlords, users of all kinds, public water utilities and the private sector in design and planning;

— cultural sensitivity, taking into account values, attitudes and the behaviour of the user.

4.2 Protection of public health

The requirements of ISO 24511 apply.

Safe and sanitary disposal of wastewater should be a public health priority. Wastewater should be disposed of in a manner that ensures that:

— drinking water supplies are not threatened;

— direct human exposure is not possible;

— waste is inaccessible to vectors, insects, rodents or other possible carriers;

— odour or aesthetic nuisances are not created.

The following should be considered.

— Discharges of untreated or partially treated wastewater from basic on-site domestic wastewater systems cause public health risks and negative environmental health effects.

— The presence of nitrates or bacteria in the drinking water well indicates that liquid from the system may be flowing into the well through the ground or over the surface (water analyses available from the local health department will indicate whether this is a problem).

— The reuse of reclaimed water (treated effluent) is encouraged; however, the relevant authority should establish that the extent of treatment, the method of application and the reuse purpose for reclaimed water does not create public health risks and adverse environmental impacts before approval is granted. Reuse is only permitted for non-potable (not for human consumption) purposes.

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For further guidance on possible actions, see ISO 24511:2007, Annexes C and D.

4.3 Protection of users and operators

All users and operators need protective equipment when handling wastewater. Appropriate training should be available for users and operators.

Health protection of the owners of the premises or workers providing emptying services should also be accounted for.

The health and safety precautions for users and operators should be documented and reviewed periodically. The actual health and safety situation should be reviewed at prescribed intervals.

4.4 Meeting the needs and expectations of users

The requirements of ISO 24510 and ISO 24511 apply.

NOTE In many cases, a favoured technology is chosen and little attempt is made to include the views of users. Users are most interested in seeing improvements to their living conditions, e.g. due to health issues, matters of privacy and safety for family members.

The requirements of the users should be identified for the site (number of users, economic costs and cultural acceptance) so that the implemented technologies meet the users' needs and expectations.

Basic on-site domestic wastewater systems should be secure, comfortable, convenient and safe for all kinds of users (children, adults, elderly and disabled persons).

Users' expectations typically relate to:

— response to complaints;

— reporting of financial results;

— consultation on plans for changes;

— involvement in electing or appointing management positions;

— expectations that public health and the environment will be protected.

If there is potential for wastewater reuse, the needs and expectations of the potential end-users of the treated wastewater and/or residues should be considered.

4.5 Provisions of services under normal and emergency situations

The requirements of ISO 24511 apply.

User interfaces intended for emergency situations should be portable/easy to assemble, as applicable.

The system (assets) should have written and visual instructions for operating and maintenance plans for normal and emergency situations. Such plans should include advice for situations that could occur because of the technology used or the site location.

See ISO 24511:2007, Annexes C and D, for additional guidance.

4.6 Sustainability of basic on-site domestic wastewater systems

The requirements of ISO 24511 apply.

Whenever possible, effluents should be used beneficially or disposed of in a safe and appropriate way. The focus should be on the outputs of systems and their (potential) value.

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It should be determined if there is a real or potential demand for reuse of sanitation system products; such reuse systems need to be designed considering health and safety requirements.

When possible, nutrients recovered from faeces and urine should be recycled and used at household level as fertilizer or soil improver. Safety and hygiene issues should be taken into consideration.

The system (assets) should be maintained and should provide the capacity to meet current and future needs. Preventative maintenance of the facility and desludging should be identified and performed periodically so that the assets meet the criterion for functional lifespan.

Revenue sources should be developed in order to ensure cost recovery of services and financial sustainability.

See ISO 24511:2007, Annexes C and D, for additional guidance.

4.7 Promotion of sustainable development of the community

The requirements of ISO 24511 apply.

Specifically integrated water resources management and renewable energy and utilization of treated wastewater residues should be taken into consideration.

Another advantage from basic on-site domestic wastewater systems is the reuse of treated wastewater residues in agriculture for the provision of food, when applicable.

Possible actions are shown in ISO 24511:2007, Annexes C and D, for further guidance.

See ISO 16075-1, for further guidance.

4.8 Protection of the environment

The requirements of ISO 24511 apply.

Improper discharge of wastewater from the system into the natural environment can lead to high levels of pollution. Aquatic organisms living in surface waters may be endangered when untreated wastewater is discharged.

Many of the environmental impacts, e.g. salinization of soil and contamination of water resources, can be minimized through systems that are environmentally friendly.

Only basic on-site domestic wastewater systems that do not have a negative effect on the environment should be set up.

Competent authorities should ascertain the compatibility of the system for the environment. Where necessary, pre-approval for basic on-site domestic wastewater disposal may be required before home construction. The process may require site-evaluation by environmental health experts or other competent authorities.

Management should ensure that failing basic on-site domestic wastewater systems do not have negative environmental effects as a result of discharge of partially treated or untreated wastewater.

Designs should include safeguards to ensure that failing on-site domestic wastewater systems do not cause accumulation of wastewater on the ground, its percolation into ground water or its flow into waterways that are close to the failing system.

From the perspective of water environment conservation, existing basic on-site domestic wastewater systems that are found to have negative effect on the environment should be replaced by systems that meet local environmental requirements and are affordable.

For further guidance, see possible actions as shown in ISO 24511:2007, Annexes C and D.

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5 Components of basic on-site domestic wastewater systems

5.1 General

Basic on-site domestic wastewater systems generally comprise:

— user interface;

— collection and transport of sanitary waste/wastewater and residues removed from wastewater;

— treatment of sanitary waste/wastewater and residues removed from wastewater;

— disposal/reuse of treated effluent;

— disposal/reuse of treated residues.

Table 1 outlines the chains of successive components of basic on-site domestic wastewater technologies.

NOTE Table 1 is adapted from pS-Eau[6], in which the component "user interface" is called "access".

Table 1 — Chains of successive components of basic on-site domestic wastewater technologies

Component	Definition	Objective
User interface	Technologies with which the user comes into contact and access the sanitation system.	To improve the sanitary conditions in people's homes.
Collection	Technologies which enable wastewater to be collected, temporarily stored and, if appropriate, to be partially treated.	To improve the sanitary conditions in people's homes.
Transportation	Technologies that transport wastewater away from the user's home to temporary disposal, treatment or discharge sites.	To ensure the health and hygiene of the neighbourhood.
Treatment	Technologies used to treat wastewater and residues in order to reduce the pollution load by means of physico-chemical and/or biological processes.	To reduce pollution and ensure the health of the community.
Disposal/reuse	Technologies or methods by which residues are ultimately disposed of in the environment or reused as useful resources.	To allow a safe and adequate disposal of treated residues (disposal) or the utilization of treated residues (reuse).

In some simple systems (e.g. pit latrines), the treatment component is not present or, if present, can include only a screening component, depending on the quantity and quality of the wastewater and the disposal method.

Depending on the extent of the development of wastewater management in a particular country or area, only one or a few of the components mentioned in Annex B may be used (e.g. only collection, disposal).

5.2 Basic on-site domestic wastewater systems

5.2.1 User interface

Toilets and washing facilities are the user interfaces with which the user comes into contact and which provide access to the sanitation system.

Toilets may be designed to allow the separation of urine and faeces.

User interfaces including (but not limited to) the following are considered, depending on local circumstances:

— simple ventilated/unventilated pit latrine;

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— double ventilated improved pit latrine/fossa alterna;

— dry toilet (including urine diverting dry toilet, composting toilet and other basic dry toilet models and their variations);

— pour flush toilet;

— waterless urinal;

— cistern flush toilet;

— washing facilities, e.g. grey water sink;

— soak-away, e.g. for grey water.

NOTE 1 For descriptions, see Annex B.

NOTE 2 To maximize the use of water, especially where it is in short supply, water that has been used for washing hands and/or anal areas can afterwards be utilized, where possible, as flushing water (e.g. toilets where the top of the water tank forms a sink).

5.2.2 Collection

Collection facilities contain human excreta awaiting transportation, including drums and containers, vaults and chambers, and double pit system.

Collection technologies including (but not limited to) the following may be considered:

— above ground tank (jerrycan/other tank);

— under or below ground tank (drum/vaults/chambers);

— human-powered emptying;

— motorized (pump or vacuum) emptying;

— transfer station (underground holding tank).

NOTE For descriptions, see Annex B.

5.2.3 Transportation

Transportation may be by way of carts, tricycles or any other human-powered multiple-wheeled vehicles, trucks and vacuum tankers.

NOTE 1 When water is used, conventional drainage systems (gravity sewers) and non-conventional drainage systems (settled sewage or simplified sewer systems) can be applicable.

NOTE 2 For descriptions, see Annex B.

5.2.4 Treatment

The following basic on-site domestic wastewater treatment facilities should be considered, depending on local circumstances. The treatment technologies are listed in two groups.

a) Technologies primarily for the treatment of wastewater may include:

— septic tank with one or more compartments without discharge;

— septic tank system with discharge and adequate filtration;

— upflow anaerobic sludge blanket reactor (UASB);

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— stabilization ponds (anaerobic, facultative, aerobic, maturation);

— natural or constructed wetland;

— land treatment (slow filtration, rapid filtration and overland flow or subsurface dispersion);

— compact biological treatment units, based usually on attached growth (such as trickling filters or rotating biological contactors), suspended growth biological processes (such as low-rate activated sludge) or hybrid aeration systems (suspended and attached growth in the same tank).

b) Technologies primarily for the treatment of sludge may include:

— sedimentation/thickening ponds;

— unplanted drying beds;

— planted drying beds;

— co-composting (where composting is required with other available organic waste);

— anaerobic biogas reactor.

NOTE For descriptions, see Annex B.

5.2.5 Disposal/reuse

This subclause deals with disposal (see Figure 1) of residues and reuse of treated wastewater and sludge.

The recovery of resources for economic use by post treatment should be considered when designing basic on-site domestic wastewater systems.

Some examples of disposal/reuse of wastewater sub-products may include:

— effluent discharge to the natural environment;

— effluent use in irrigation;

— land application of treated/stabilized sludge (biosolids) as fertilizer/soil conditioner;

— energy recovery option of sludge treatment (i.e. recovery and use of biogas and/or energy recovery from incinerating solids).

NOTE For descriptions, see Annex B

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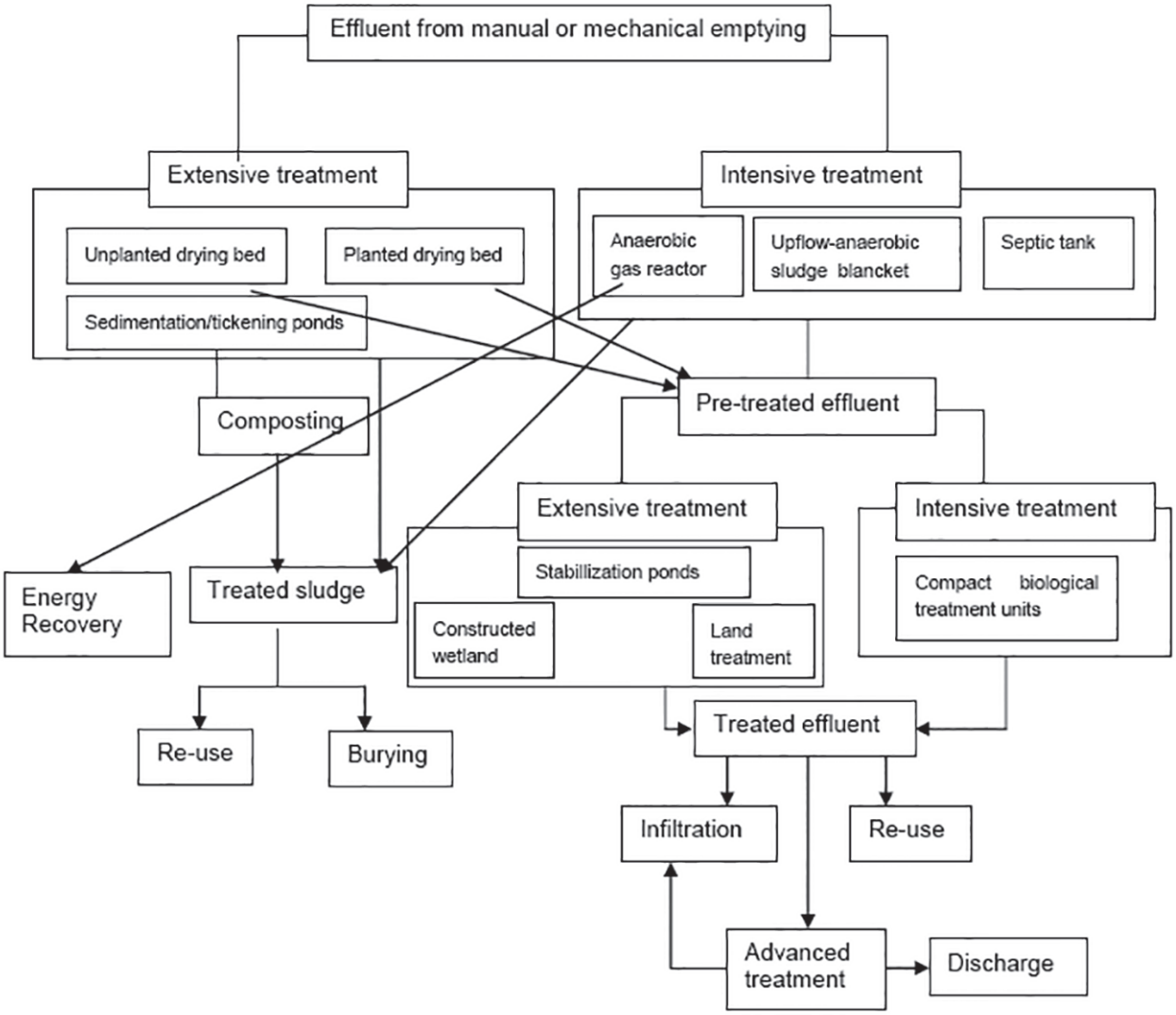

NOTE Figure source: Adapted from pS-Eau[6].

Figure 1 — Examples of typical available technologies for on-site treatment/disposal

6 Management of basic on-site domestic wastewater systems

6.1 General

The sustainability and continuity of the entire sanitation system depends on good organization and management of collection, transportation, treatment and disposal.

Management of basic on-site domestic wastewater systems should ensure that they meet the needs of the users and community to fulfil the objectives of basic on-site sanitation (see Clause 4).

Economic and cultural factors should also be identified to meet the objectives for providing basic on-site domestic sanitation to as many users as possible.

The basic on-site domestic wastewater systems should protect both the public health and the environment.

Conservative assumptions for operation and maintenance and managing system risk should be used to obtain the best possible result in the treatment of domestic wastewater. The health risks of ineffective

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system operation or failure demand that a rigorous system of equipment and process maintenance and risk mitigation be installed.

The basic on-site domestic wastewater system is used for individual residences or small villages, where the responsible body might have limited technical/socio-economic capacity to implement, operate and maintain it. The system needs to be cost effective and sustainable, as well as easy to maintain while meeting the stated objectives for improved sanitation and treatment of domestic wastewater. The management guidance and risk assessment should be flexible to allow for use of other types of basic technologies that may be developed.

Appropriately treated wastewater is eventually returned to the environment and can have significant positive impact on both quantity and quality of natural water resources. Basic on-site domestic wastewater systems are often close to sources of drinking water and should produce a treated effluent that does not contaminate the drinking water source and does not affect the uses of the receiving waters.

Effective and safe management of residues resulting from wastewater treatment, including their final disposal or reuse, is becoming increasingly important due to concerns about both environmental protection and resource conservation.

Basic on-site domestic wastewater systems may have a useful life of more than one generation depending on the technology and its operation and maintenance. Consequently, basic on-site domestic wastewater systems should be durable and repairable and should consistently treat various concentrations of domestic wastewater.

6.2 Independent management of system function and stakeholder communication

Where the basic on-site domestic wastewater systems are not managed by the owners of the premises, the organization for the management should ensure that the systems function and are maintained as designed and that services are performed by fully trained people, in order to prevent risk to the environment and the community. A system function and stakeholder communication process should be developed (see Figure 2). The organization should provide information using data between the users and the service provider or utility, so that the community is informed, supports the use of the basic on-site domestic wastewater systems and sees the benefit to its needs and the environment.

To reach out to various stakeholders, different communication channels should be adapted.

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